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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
VU, TUAN A	

ART UNIT	PAPER NUMBER
2193	

DATE MAILED: 08/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/731,678	DO ET AL.	
	Examiner	Art Unit	
	Tuan A. Vu	2193	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *96-113* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *96-113* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *7/17/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to the Applicant's response filed 7/17/2006.

As indicated in Applicant's response, claims 98, 105 have been amended. Claims 96-113 are pending in the office action.

Claim Rejections - 35 USC § 101

2. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

3. Claims 96-113 rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

> The Federal Circuit has recently applied the practical application test in determining whether the claimed subject matter is statutory under 35 U.S.C. § 101. The practical application test requires that a " useful, concrete, and tangible result" be accomplished. An "abstract idea" when practically applied is eligible for a patent. As a consequence, an invention, which is eligible for patenting under 35 U.S.C. § 101, is in the "useful arts" when it is a machine, manufacture, process or composition of matter, which produces a concrete, tangible, and useful result. The test for practical application is thus to determine whether the claimed invention produces a "useful, concrete and tangible result".

Specifically, claims 96 recites a method for designing software system, comprising defining design parameters (DP) parameters, decomposing set of functional requirements (FR) and said parameters to create hierarchy thereof, defining a matrix for mapping parameter and requirements of such hierarchy, and use the matrix to further define object oriented structure wherein a FR represents an OO object and a DP represents a input to said object. The claim as a whole amounts to defining a software structure with descriptive elements representing parts of the software structure. The final result thus conveyed does not reasonably teach that a tangible and concrete real-world result has been generated at the end of the method steps leading to

defining of a software structure; that is, such structure remains but an abstract entity internal to a definition process, hence not materialized out into a reasonable real-world useful entity based on actual data transformation by hardware supported means other than a mere definition process, which appears to be just a internal or abstract function. The claim for failing to convey the yielding of a concrete, useful and tangible result, is rejected for leading to a non-statutory subject matter.

Claim 105, similar to claim 96, amounts to defining a structure without any further teaching on any practical use of the structure in order to yield a real world useful result. And in light of the rationale as set forth above, claims 97-104, and 105-113 are rejected for the deficiency of not fulfilling the Practical Application requirement.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 96-113 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nam P. Suh, "Axiomatic Design Theory for Systems", *Research in Engineering Design*, Vol. 10: pp. 189-209, MIT, 1998 (hereinafter Suh_1), further in view of Sung-Hee Do and Nam P. Suh, "Systematic OO Programming with Axiomatic Design", IEEE Computer, Vol. 32, No.10, Oct 1999, *Integrated Engineering*, pp. 121-124 (hereinafter Suh_2).

As per claim 96, Suh_1 discloses a method of designing a software system, comprising:

defining a set of functional requirements that describe what the software system is to achieve (e.g. FRs – Fig. 1- pg. 195; Fig. A1, pg. 204; ch. 4.1, pg. 191);

defining a set of design parameters, where each design parameter in the set satisfies at least one of the functional requirements (DPs – Fig. 1, pg. 195; Fig. A1 – pg. 204);

decomposing the set of functional requirements and design parameters to create hierarchy of functional requirements and a hierarchy of design parameters (e.g. *FR and DP hierarchies* - Fig. 1, pg. 195; chp. 6.1→6.3, pg. 194-196), wherein at least one functional requirement of the set of functional requirements is a parent functional requirement at a first level in the hierarchy of functional requirements and is decomposed into at least two child functional requirements at a second level in the hierarchy that is below the first level, and wherein the at least two child functional requirements collectively accomplish the parent functional requirement (see FR1 → FR11, FR12 – Fig. 1;, *step 1: FRs mapping DPs*, ch. 4.2→ 4.4, pg. 191-193);

defining a design matrix that maps each design parameter in the hierarchy of design parameters to the at least one functional requirement in the hierarchy of functional requirements that the respective design parameter satisfies (e.g. ch. 4.2→ 4.4, pg. 191-193; chp. 6.1→6.3, pg. 194-196); and

using the design matrix to define software modules (Fig. 2-4, pg. 196; ch. 6.4 pg. 197) of the software system, wherein at least one functional requirement in the hierarchy of functional requirements represents a software object of the software system (e.g. Fig. 3, pg. 196; *modules Ms* - ch. 6.6, pg. 198; ch. 7, pg. 199), and wherein at least one design parameter in the hierarchy of design parameters represents an input to the software object (e.g. *input to M1231* – right col., ch. 6.2, pg. 195; ch. 6.4 pg. 197).

But **Suh_1** does not explicitly disclose that the FR-derived modules being designed from the matrix object are object-oriented structures. The concept of modularization of software architecture with parent/child relationship (see ch. 6.1 pg. 194 to ch. 6.4, pg. 197; Fig. 1, 3, 4) considered by Suh_1 along with reassembling of modules from a database (see ch. 6.7, pg. 199) and reusability implemented via library of software modules (see ch. 8.1, pg. 200) suggest the known benefits of object-oriented implementation of large software systems at the time the invention was made, some of which being tracking of changes (or failures) and understanding interaction dependency between modules (see Suh_1, ch. 10, pg. 203). **Suh_2**, in a similar approach to implement axiomatic design to large systems analogous to Suh_1, teaches the same decomposition of levels of software modules via matching of DP/FR using a control matrix; and based upon the module derivation, teaches identification of classes as well as its interfaces, and attributes or methods thereof to represent a DP (see Fig. 1, pg. 122; middle column, pg. 124). Based on the concept of independent reassembling of modules per development instance and reusability control from Suh_1, it would be obvious for one skill in the art at the time the invention was made to implement Suh_1 modules associated with each FRs, so that these modules are reuse object-oriented classes or interfaces as taught by the approach by Suh_2, because the creation of OO or classes instances as they are retrieved from reuse can support relationships (as in a *interface*) between object classes and object operations, such that existing designs can be reused to support further decomposition, and/or creation of new designs, or to help diagnose or handle tracking due to software change (see Suh_2: middle pg. 121; middle para, pg. 124).

As per claim 97, Suh_1 teaches software modules representing equivalent of hardware assemblies (ch. 4.2 pg. 191) to match functional requirements, but does not explicitly disclose that at least one element of the design matrix and the at least one design parameter represents an operation performed by the software object; but in view of the classes and method teaching from Suh_2 as set forth above, the operation limitation, i.e. a method by a software object in light of OO implementation from above, would have been obvious.

As per claim 98, Suh_1 discloses that wherein the act of defining the set of define parameters further comprises determining the set of design parameters by mapping the set of functional requirements into a physical implementation domain (e.g. Fig. A1, pg. 204).

As per claims 99-100, Suh_1 discloses an act of determining if the design matrix is decoupled (eq. 15, pg. 197); and is not decoupled, manipulating the design matrix into lower triangular form (e.g. middle matrix line 2, 7; eq. 15, pg. 197).

As per claim 101, Suh_1 (in view of Suh_2) discloses wherein the at least one functional requirement that represents a software object includes at least two functional requirements, and wherein a first of the at least two functional requirements represents a first software object and a second of the at least two functional requirements represents a second software object (e.g. Fig. 1, ch. 6.1-pg. 194-195; ch. 6.6. pg. 198; ch. 4.5 pg. 193).

As per claim 102, Suh_1 discloses defining a relationship between the first software object and the second software object using a junction (e.g. Fig. 2-3, pg. 196).

As per claim 103, Suh_1 discloses defining a third software object by combining the first software object and the second software object according to a type of the junction (e.g. Fig. 2-4, pg. 196).

As per claim 104, Suh_1 discloses wherein the type of the junction is one of: a summation junction; a control junction', or a feedback junction (e.g. Fig. 2-4, pg. 196).

As per claim 105, Suh_1 discloses computer readable medium encoded with instructions that, when executed on a computer system, perform a method of allowing a user to define a software system (e.g. *software systems* – Introduction, pg. 189), the method comprising allowing the user to:

define (a set of functional requirements ...);

define (a set of design parameters);

decompose (the set of functional requirements and design parameters ...);

define (a design matrix that maps ...); and

using the design matrix (to define software modules...) as recited in claim 96.

Thus, all of which limitations are respectively addressed according to the rejection set forth in claim 96.

But Suh_1 does not disclose that the software modules are to define an object-oriented structure. However, this limitation has been addressed as obvious in claim 96.

As per claims 106-113, these claims correspond to the claims 97-104 for reciting the same subject matter therein respectively; hence are rejected using the rationale set forth therein, correspondingly.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

7. Claims 96-115 are rejected under 35 U.S.C. 102(a) as being anticipated by Nam P Suh, *Axiomatic Design of Software*, copyright @ August 22, 1999, chapter 5, pp. 2-74 (hereinafter SuhNam – submitted with IDS filed 7/17/2006).

As per claim 96, SuhNam discloses a method of designing a software system, comprising:

defining a set of functional requirements that describe what the software system is to achieve (e.g. ch. 5.2.1, pg. 8-12);

defining a set of design parameters, where each design parameter in the set satisfies at least one of the functional requirements (e.g. ch. 5.2.1, pg. 8-12, subpara (i) → (iv));

decomposing the set of functional requirements and design parameters to create hierarchy of functional requirements and a hierarchy of design parameters (e.g. 5.2.1, pg. 8-12, subpara (i) → (iv); ch. 5.3. pg. 14-24), wherein at least one functional requirement of the set of functional requirements is a parent functional requirement at a first level in the hierarchy of functional requirements and is decomposed into at least two child functional requirements at a second level in the hierarchy that is below the first level, and wherein the at least two child functional requirements collectively accomplish the parent functional requirement (e.g. ch. 5.3, pg. Pg. 14-24; Fig. Ex 5.1.a; step 4, pg. 16);

defining a design matrix that maps each design parameter in the hierarchy of design parameters to the at least one functional requirement in the hierarchy of functional requirements that the respective design parameter satisfies (e.g. ch. 5.3, pg. Pg. 14-24); and

using the design matrix to define an object-oriented structure (e.g. ch. 5.4 – pg. 36-55) of the software system, wherein at least one functional requirement in the hierarchy of functional requirements represents a software object of the software system (e.g. ch. 5.4 – pg. 36-55), and wherein at least one design parameter in the hierarchy of design parameters represents an input to the software object (e.g. step 4, pg. 16; ch. 5.4.3 pg. 41-51).

As per claims 97-104, see ch. 5.2.1, pg. 8-12, subpara (i) → (iv); ch. 5.3. pg. 14-24; ch. 5.4 – pg. 36-55; ch. 5.6, pg. 58-65)

As per claim 105, SuhNam discloses computer readable medium encoded with instructions that, when executed on a computer system, perform a method of allowing a user to define a software system, the method comprising allowing the user to:

define (a set of functional requirements …);

define (a set of design parameters);

decompose (the set of functional requirements and design parameters …);

define (a design matrix that maps …); and

using the design matrix (to define software modules…); all of which steps as recited in claim 96.

Thus, all of which limitations are respectively addressed according to the rejection set forth in claim 96.

As per claims 106-113, these claims correspond to the claims 97-104 for reciting the same subject matter therein respectively; hence are rejected using the rationale set forth therein, correspondingly.

Response to Arguments

8. Applicant's arguments submitted 7/17/2006 with respect to claims 96-113, have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tuan A Vu whose telephone number is (272) 272-3735. The examiner can normally be reached on 8AM-4:30PM/Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki can be reached on (571)272-3719.

The fax phone number for the organization where this application or proceeding is assigned is (571) 273-3735 (for non-official correspondence - please consult Examiner before using) or 571-273-8300 (for official correspondence) or redirected to customer service at 571-272-3609.

Any inquiry of a general nature or relating to the status of this application should be directed to the TC 2100 Group receptionist: 571-272-2100.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Tuan A Vu
Patent Examiner,
Art Unit 2193
August 11, 2006